AMENDMENTS TO THE CLAIMS:

This listing of claims will replace all prior versions, and listings, of claims in the application.

LISTING OF CLAIMS:

1(currently amended). A roller chain transmission in the timing drive of an automobile engine, the transmission comprising a toothed driving sprocket on a crankshaft of the engine, at least one toothed driven sprocket on a camshaft of the engine, and a roller chain having interleaved pairs of inner and outer plates, cylindrical bushings fixed to bushing holes in the inner plates, pins rotatable in said bushings and fixed to pin holes in the outer plates, and rollers rotatable on said bushings, ~~and a toothed sprocket~~ said toothed sprockets meshing with the roller chain,

wherein the outer diameter D of the rollers, the outer diameter d of the pins and the height H of the inner plates satisfy the following relationships with respect to the pitch P of the roller chain:

$0.72P \leq D \leq 0.79P$

$0.40P \leq d \leq 0.44P$

$0.96P \leq H$,

and

wherein the sprocket teeth of at least one of said toothed sprockets have ~~a~~ an arc-shaped tooth gap bottom, the arc of the tooth gap bottom having ~~with~~ a radius r, satisfying the relationship $0.505D \leq r \leq 0.505D + 0.069\ \sqrt[3]{D}$, where r and D are measured in millimeters.

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REMARKS/ARGUMENTS

Claim 1 has been amended to recite that the roller chain transmission is in the timing drive of an automobile engine, and to specify more clearly that the chain is in mesh with one of the timing drive sprockets, namely the crankshaft sprocket or a camshaft sprocket. The claim has also been amended to make it clear that the radius "r" is the radius of the arc of an arc-shaped tooth gap bottom, and to make it clear that, for the purpose of the relationship between the tooth gap bottom radius r and the roller diameter D, r and D are measured in millimeters.

A terminal disclaimer is being submitted herewith to address the provisional, obviousness-type, double patenting rejection.

The applicants request reconsideration of the rejection under 35 U.S.C. §103 on Ledvina et al. and McKnight et al..

Ledvina et al. describe a roller chain having components corresponding to those of the applicants' roller chain. However, as the Examiner has pointed out, Ledvina et al. do not disclose the specific relationships of the chain pitch P to the pin diameter d, the roller diameter D and the inner plate height H as set forth in claim 1. As we understand it, it is the Examiner's position that the choice of values for D, d, and H in relation to P is a matter of routine optimization, and that the claimed relationship between the value of r and the roller diameter is taught by McKnight. (It is believed that the examiner intended to cite McKnight for the relationship of the roller diameter to the sprocket tooth gap radius, and that Bowmen was cited inadvertently in the first full paragraph on page 3 of the Office action.)

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We acknowledge that it is generally non-inventive to discover an optimum or workable range by routine experimentation. However, a rejection made on this basis is essentially a finding that the claimed subject matter is *prima facie* obvious. Such a rejection is rebuttable, for example by showing that the claimed ranges are critical, or alternatively, by showing that the prior art "teaches away" from the claimed invention. In this case, the prior art "teaches away."

First, concerning the relationships between the chain pitch P and the roller diameter D, the pin diameter d, and the inner link height H, claim 1 requires D to be in the range from 0.72P to 0.79P, d to be in the range from 0.40P to 0.44P and H to be at least 0.96P.

The table at the top of column 9 in Ledvina gives ranges for various parameters of a roller chain having a pitch of 0.375 inch, including link height and pin diameter. The table also specifies values of link height, pin diameter and roller diameter for a "best method" chain.

The table specifies that the link height should be at least 0.330 inch. Since 0.330/0.375 =0.88, the link height of at least 0.330 inch translates to at least 0.88P, which encompasses the applicant's range of at least 0.96P. However, the pin diameter range is given as not greater than 0.129 inch. Since 0.129/0.375 =0.34, the specification that the pin diameter be not greater than 0.129 corresponds to a specification that the pin diameter be not greater than 0.34P, which is well outside the applicants' claimed range of 0.40 to 0.44P.

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The "best method" column in the table specifies a link height of 0.350 inch, a roller O.D. of .250 inch and a pin diameter of 0.1125. These numbers translate to H=0.93P, D=0.67P and d=0.30P, all well outside the applicants'. claimed ranges.

From the above observations, it will be apparent that the table at the top of Ledvina's column 9, not only specifies a range for d that is outside the applicant's claim, but teaches a best mode in which each of the three parameters, D, d and H is outside the applicant's claimed ranges.

The second table in Ledvina's column 9 gives ranges for link height and pin diameter for a roller chain having a pitch of 0.315 inch. The table specifies that the link height should be at least 0.300 inch. Since 0.300/0.315 =0.95, the link height of at least 0.300 inch translates to at least 0..95P, which encompasses the applicant's range of at least 0.96P. However, the pin diameter range is given as not greater than 0.120 inch. Since 0.120/0.315 =0.38, the specification that the pin diameter be not greater than 0.120 corresponds to a specification that the pin diameter be not greater than 0.38P, which is outside the applicants' claimed range of 0.40 to 0.44P.

The "best method" column in the table specifies a link height of 0.305 inch, a roller O.D. of .222 inch and a pin diameter of 0.100. These numbers translate to H=0.97P, D=0.70P and d=0.32P, the ranges for D and d both being outside the applicants' claimed ranges. The table also gives values of H, D and d for a "heavy duty" chain having a pitch of 0.315 inch. These values H=0.307 inch, D=0.22 inch and d=0.120 inch translate to H=0.97P, D=.70P and d=.38P. Here again, the values for D and d are outside the applicants' claim.

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In summary, in Ledvina's tables, not only is the range for pin diameter outside the range claimed by the applicants, but, the three of the best mode values are outside the applicants' claim in the first table, and two of the best mode values are outside the applicants' claim in both embodiments in the second table. Since Ledvina's "best method" is outside the applicants' ranges, if follows that the optimum, from Levina's point of view, is outside the applicant's range. It can hardly be concluded that the applicant's ranges are merely a matter of optimization. In short, Ledvina "teaches away" from the applicants' invention.

Concerning the relationship between the roller diameter D and the radius r of the tooth gap arc, the applicants' claim specifies that r must be at least 0.505D, and not greater than 0.505D + 0.505D + 0.069 $\sqrt[3]{D}$. In the table in column 6 of McKnight et al., the clearance curve radius 26 is given by the equation

$$Radius=\frac{CatalogChainBarrelDia.+.18}{2}$$

McKnight's dimensions, however, are in inches. Converting the dimensions to millimeters, the equation becomes

$$Radius=\frac{CatalogChainBarrelDia.+4.57}{2}$$

which is the same as $r=0.5D+2.29$. The applicant's claim, on the other hand, requires the corresponding radius r of the tooth gap arc to be in the range from 0.505D to 0.505D + 0.069 $\sqrt[3]{D}$.

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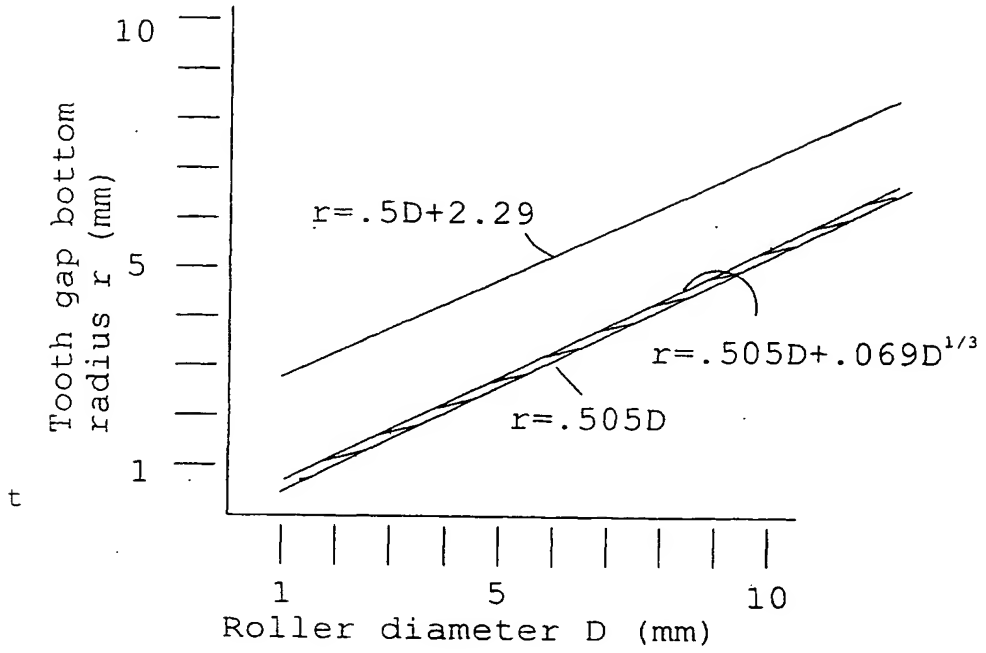
The following graph shows how the two equations differ.



$0.5D + 0.09$ becomes equal to $0.505D + 0.069\ \sqrt[3]{D}$ only when D is approximately 36 cm, which is far too large a diameter for a roller in an automotive timing chain.

In summary, Ledvina teaches away from the relationships $0.72P \leq D \leq 0.79P$ and $0.40P \leq d \leq 0.44P$, and McKnight does not teach the a relationship between r and D that would fall in the claimed range from $0.505D$ to $0.505D + 0.069\ \sqrt[3]{D}$, except at a roller size that would be far too large for an automotive timing chain. Accordingly, we submit that the case for *prima facie* obviousness on the basis of Ledvina and

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